

Consolidated Program for Research and Development for Welding of High Strength Steel Pipelines, #277 & 278

Project WP#277: Update of Weld Design, Testing, and Assessment Procedures for High Strength Pipelines

Background

High strength pipelines are expected to become a major player in long distance onshore hydrocarbon transportation. Understanding the differences between the modern high strength and older-generation linepipes is critical to the safe and economical application of those modern materials. The objectives of this project to fill the critical gaps and provide guidelines on the effective use of high strength linepipes, from design and testing to weld integrity assessment procedures. The interdependence of linepipe materials, welding processes, design requirements, and weld integrity will be investigated to enable realistic and effective use of high strength linepipes.

Progress in the Quarter

The activities in the second quarter of this project covered (1) coordinating with Project #278 to secure linepipes for specimen fabrication, (2) reviewing linepipe specifications, (3) developing weld metal tensile and toughness testing protocols, and (4) preparing for medium scale testing.

The near-term action plan has been continuously updated to reflect completed tasks and document new tasks. Multiple web-conferences were held in this quarter. The X100 linepipes needed for the first round of specimen fabrication have been identified. Three possible pipeline welding contractors have been informed of welding requirements. Literature review of linepipe property specifications is continuing. Specific focus areas for the linepipe specifications have been identified. Work is under way to address girth weld tensile strength test methods using a range of specimen geometries, including standard round bars, full-strip and split-strip tensile specimens. The development of fracture toughness testing protocol is under way with both experimental testing and numerical simulation. SE(B) and SE(T) specimens have been machined and tested. Preparation for medium scale testing includes the design and fabrication of grips, design of cooling chambers, and updating of test machine controllers. The logistics of fabricating the relatively large specimens has been discussed and will be finalized in the coming quarter.